

REMARKS

Claims 1, 2, 4-11, and 15-27 are now pending in the application. The Examiner is respectfully requested to reconsider and withdraw the rejection(s) in view of the amendments and remarks contained herein.

PRIORITY

A certified copy of the priority document was submitted along with the International Application to the International Bureau in accordance with PCT Rule 17. Thus, the priority document is available from the International Bureau and need not be resubmitted by the Applicant.

SPECIFICATION

The specification stands objected to for certain informalities. First, the Examiner asserts that the specification fails to disclose how the optical transmitter/receiver system is integrated into a central support structure of a laser scanner. Applicant respectfully disagrees. For example, Figures 1 and 2 illustrate how the system components are disposed in relation to support structure 31. Furthermore, this support structure 31 is integrated into the housing 39 of the sensor module as best seen in Figure 2. The construct of the deflection module and the sensor module are also described on page 9 of the specification. Thus, applicant asserts that this feature is disclosed by the specification.

Second, the Examiner claims it is unclear how the reflector moves in relation to the light emitting modules. With reference to Figure 1, the reflector reflector (mirror 47) rotates about axis 49 which runs perpendicular to the plane (cover section 32) in which the

transmitter modules (lenses 33) are effectively arranged (see also page 9, lines 4 to 9 of the specification).

With regard to the title, applicant has amended the title according to the Examiner's suggestions. Therefore, reconsideration and withdrawal of these objections are respectfully requested.

DRAWINGS

The drawings stand objected to for certain informalities. Reference numeral 32 is used to reference the cover section of the support structure 31. The second full paragraph on page 10 of the specification has been amended to achieve consistent use of this reference number throughout the specification. Therefore, reconsideration and withdrawal of this objection is respectfully requested.

REJECTION UNDER 35 U.S.C. § 112

Claims 1-24 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point and distinctly claim the subject matter which Applicant regards as the invention. This rejection is respectfully traversed.

With regard to claim 2, please note that due to the divergence of the radiation the cross section of the transmitted radiation increases with increasing distance from the sensor, with the overall intensity of the radiation of course being the same independent on the distance from the sensor. Consequently, if a person looks into the transmitted beam near the sensor, a relatively large proportion of the radiation impinges onto the eye of the person. If a person's eye is hit by the beam at a greater distance from the

sensor, the relevant amount of radiation is smaller. If two transmitters are used and the transmitted beams overlap due to the divergence of the radiation, the intensity of radiation which can impinge onto the eye of the person doubles. Consequently, an overlap of the transmitted beams is less critical in greater distances from the sensor. At small distances from the sensor, the eye of a person can only be hit by one beam if – and this is the idea behind the subject matter of claim 2 – the transmitter modules are arranged such that there is no overlap at small distances from the sensor. The corresponding advantage for the operation of the sensor is described on page 3, line 11 to page 4, line 2. Since an overlap in a “near region” is avoided, the transmitter powers of the transmitter modules can be increased since it is impossible that a person’s eye is hit by more than one beam. At greater distances, where an overlap of the beams occurs, this is not critical due to the lower intensity per unit area.

Remaining claims have been amended to address the Examiner’s concerns. Therefore, reconsideration and withdrawal of this objection is respectfully requested.

REJECTION UNDER 35 U.S.C. § 102

Claims 1, 3, 4, 5, 6, and 8 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,552,893 (Akasu). This rejection is respectfully traversed.

Claim 1 relates generally to an optoelectronic sensing device including a plurality of transmitter modules which are aligned such that a total radiation front is formed. This means that in a case where two transmitters are used, the two radiation beams are neither coincident nor spaced apart. Rather, at relevant distances, the two beams

together form an overall "spot" on an object in the monitored zone which is larger than the individual "spots". If line lasers are used, i.e. if each "spot" is actually a short line, the lasers are aligned such that the two individual lines together form an overall line which is longer than each of the individual lines. Regarding this embodiment, reference is made to the second paragraph on page 13 of the specification: With a vertical divergence of 1.6° for each individual line, an overall divergence of the resulting overall line is twice as high, i.e. amounts to 3.2° . This is the idea behind original claim 3.

This alignment of the plurality of transmitter modules together with the possibility to control the transmitter modules for an alternate transmission of radiation (original claim 21) and the continuous rotation of the deflection device (original claim 13), a scanning pattern results according to which on an object in the monitored zone the "spots" of the individual radiation beams are distributed over the object like the black or white squares of a chess board. The actual relative positions of the "spots" are of course dependent on the alignment of the transmitter modules, on the time interval between the alternate "firing" of the transmitter modules, as well as on the rotational speed of the deflection device. This scanning pattern is achieved with a comparatively simple construction by using a common deflection device with one common planar reflection surface for the transmitter modules. Claim 1 has been amended to further define these features of the present invention.

Akasu (US 5,553,893) discloses the use of a plurality of laser diodes 11, 12, 13 which can be sequentially pulse-driven together with a scanning device having a mirror 21 with one reflection surface. However, although this arrangement is referred to as a "scanning" device, the mirror 21 is not rotated continuously but in a step-wise manner

(see for example column 3, lines 45ff: "one step angle of the stepping motor 22 is 0.75° so that the mirror 21 rotates 0.75° for each step "). The laser diodes are "fired" when the mirror is not rotating. Consequently, the scanning patterns which are achieved with this prior art device are different from those which are possible with the device according to amended claim 1 as explained above.

Likewsie, Reime (US 6,828,546 B2) fails to disclose for example a continuously rotatable deflection device as recited in amended Claim 1.

Hayashi (US 6,649,904 B2) does not disclose the particular alignment of a plurality of transmitter modules as defined in amended claim 1. In view of the object of this prior art invention and the alternative embodiments shown for example in figs. 6 and 7, the only purpose of the plurality of projectors 110 is to obtain more detailed information regarding the object (= car passenger) as compared with the light beams used in the prior art (see column 1, lines 38ff). Moreover, Hayashi neither discloses nor suggests an alternate operation of the projectors 110. For at least these reasons, this reference fails to remedy the deficiencies of the other relied upon references.

In sum, none of the relied upon reference, either individually or collectively, teach or suggest an optoelectric sensing device which is able to generate the scanning pattern as disclosed in the present application and recited in amended claim 1. Therefore, it is respectfully submitted that Claim 1, along with claims depending therefrom, defines patentable subject matter over the relied upon references.

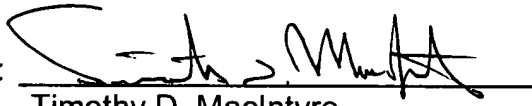
CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested.

If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: February 2, 2007

By: 
Timothy D. MacIntyre
Reg. No. 42,824

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. Box 828
Bloomfield Hills, Michigan 48303
(248) 641-1600

TDM/med